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A SOCIAL NETWORK ANALYSIS OF THE IS FIELD: A CO-AUTHORSHIP NETWORK STUDY

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ABSTRACT

The IS field is a fragmented field with many different research strategies and topics. To complicate this matter, there are many different publication venues and geographic locations. This study will try to look at the co-authorship social network (SN), using three different venues. One of the venues is the top journal in our field, the other a regional conference, and the third is a top French IS journal. The study will take a social network analysis (SNA) approach to see if there are differences in these venues and to take a preliminary look at the IS field. The results indicate that even though we research under the umbrella of IS, differing venues seem to have differing cliques of researchers. The divide between North American and France is also seen in how different the publication strategies seem to be between the two geographic areas.

Keywords

Social Network, Network Analysis, MIS Quarterly, SAIS, Systèmes d'Information et Management

INTRODUCTION

The study of how researchers conduct research is of importance to any field. In particular social network analysis of academic publishing has been conducted in the fields of marketing (Pieters et al. 1999), and information systems (IS) (Nerur et al. 2005; Polites et al. 2008; Song et al. 2008; Vidgen et al. 2007). Within IS the network analysis can be extended to knowledge management (KM) (Song et al. 2008). Outside of academics there have been studies on online social networks (Howard 2008; Kleinberg 2008), geographic spread of social networks (Liben-Nowell et al. 2005).

Research in academia is invariably a social phenomenon. There are two methods in which to publish, whether you use co-authors or solo-author. Either way there is invariably social connections being made. When a paper has co-authors, the authors are socially connected via co-authorship. When solo-authoring social connections are still citations being used. Whether you co-author or solo-author, the majority of papers in academia today have citations and thus a social connection via intellectual recognition. By the use of citations an author is giving credit to a thought, taking thoughts from various different sources, combining these thoughts to complete a different point (Callon et al. 1981). When we cite one another we are creating a social connection via citations to other authors.

REVIEW OF METHODS TO STUDY SOCIAL CONNECTIONS VIA SNA

There are also two major ways in which social network analysis can be utilized for analyzing social connection in academic publishing. One connection is via the co-authorship. Connections are made when two or more people agree to collaborate on a project. During co-authorship network analysis, all co-authors are assumed to know each other. Some characteristics of the two types of connections are that with co-authors, you have stronger bonds, less connections, but the strength of the connections may not be seen. With co-citation analysis, the connections are weaker, typically there are more connections, and the strength of connections cannot be seen as well.

The use of network analysis has stretched from neurobiology, statistical physics, to the notion of 'six degrees of separation', and games such as 'six degrees of Kevin Bacon' that try to link different actors to the famous actor (Guare 1992; Liben-Nowell et al. 2005; Strogatz 2001). The term 'six degrees of separation' coined by Guare (1992) is really a phrase for the 'Small World Problem' by Travers and Milgram (1969), where they found that everyone in a large society were connected in some way by about 5.5 linkages (Travers et al. 1969). Even in information systems (IS) social network analysis has been applied (Nerur et al. 2005; Polites et al. 2008). With the advent of social networking sites such as myspace.com and friendster.com, social network analysis has been applied to these sites as well (Howard 2008; Kleinberg 2008). Social network analysis has its advantages. "However, one of SNA's advantages is that it can in fact uncover subtle, unrecognized relationships between journals, and thus can aid in the development of more accurate classification schemes in the future" (Polites et al. 2008, Page 99).

Typically social network analysis of academia has been limited to two types of research, those that look at journal citation networks, and those that look at co-authorship networks. In journal citation networks, journals are the units (nodes) and how articles in each journal cite other journals is analyzed for a period of time (Biehl et al. 2006; Nerur et al. 2005; Pieters et al. 1999). In co-authorship networks, authors are the units (nodes) and the tendency of authors that co-author to continue to publish in a similar fashion or to a similar outlet are analyzed (Acedo et al. 2006; Barabasi et al. 2002; Eaton et al. 1999). The author acknowledges that there are many other areas of SNA that aren't covered due to the length of this article.

Several aspects of the SNA are looked at. The node, edge, connectivity, and distance are identified. A node is defined as a point on the network (Barabasi et al. 1999; Coleman 1988; Kleinberg 2000; Travers et al. 1969). For this research a node is a researcher. An edge of a network is defined as a line connecting two nodes (Barabasi et al. 1999; Coleman 1988; Kleinberg 2000; Travers et al. 1969). An edge can be non-directional, directional, or bidirectional. For example co-authorship will be shown as a non-directional edge. Citations can be shown as a directional edge. If author A cites author B, and author B cites author A, a bidirectional edge will be used. In the current study an edge is a line connecting two co-authors. If there are multiple co-authors an edge will connect all co-authors to each other. For example a paper with five authors will have five nodes and ten edges.

Distance is the minimal length between two distinct nodes (Travers et al. 1969). A distance is measured by counting the minimal number of edges it takes to traverse from one node to another node. Traversing edges can take into account the direction of the edge or not. In the current study directional edges are not used so to find the distance between two authors, you only need to minimal number of edges it takes to connect the two authors.

Connectivity is a notion of how an author (node) in the network is connected to others via an edge. Depending on the research question connectivity can be measured by the pure number of edges coming out of the node. The research may want to discover how a researcher is connected so a weight and distance measure to other nodes may be incorporated. Strength of edges and nodes may also be included in the measure. Connectivity may be shown on the network by proximity in the nodes. Using proximity measures can show how many authors are closely related to one author, or how many close authors are within a certain proximity (Albert et al. 2002; Barabasi et al. 1999; Barabasi et al. 2002; Henry et al. 2007; Vidgen et al. 2007). In the current study the connectivity is amount of edges that a node (author) has connected. This measure the amount of co-authorship that a particular author has. Keep in mind that an author that uses more co-authors will have more connectivity than one that single authors.

METHODOLOGY

The goal of this study is to find out how the social networks in IS are influencing researchers. In order to do this, we take a preliminary look at social networks apparent in publications. For the purpose of this paper co-author analysis was conducted at the journal level, and conference level. There were two journals analyzed. One the leading North American IS journal, and the other a leading French language IS Journal. These were Management Information Systems Quarterly (MISQ) and Systèmes d'Information et Management (SIM) respectively. The conference used was the Southern Association of Information Systems (SAIS) conference.

Data from the past five year period (2005 – 2009) was obtained using websites from each of the targets (MISQ 2009; SAIS 2010; SIM 2010). There were a few differences to note (Table 1). First the number of issues for MISQ were 21 due to a special issue in 2006 that was included in the study. SIM is also a quarterly journal but does not publish on particular months. SIM does not have their articles from the most recent six months, thus only two issues out of four were obtained from the 2009 year. SAIS is a yearly conference, so the number of issues were only five in the period studied. There seemed to be a limit on the number of articles published in the SIM as only four or five articles were published by SIM for each of the issues. MISQ and SAIS did not seem to adhere to a strict publication limit that seemed to exist with SIM.

	Start Date	End Date	No. of Issues	No. of Articles	Author Count	Author Count (no repeats)
MISQ	March 2005	December 2009	21	202	480	375
SIM	2005	Middle 2009	18	72	125	115
SAIS	March 2005	March 2009	5	209	434	323

Table 1. Venue Data

Author data from each article published were copied to a spreadsheet for analysis. Data needed cleansing, as formats were different from each of the websites. One interesting observation was that with the French SIM journal there was a lack of middle initial/name entries compared to the US counterparts. This was due to the cultural differentiation on the use of middle initial/names, and there was a definite difference in the use of a middle initial/name.

There were a total of 202 (MISQ), 72 (SIM), and 209 (SAIS) articles over the period. The raw count of the number of authors revealed 480 (MISQ), 125 (SIM), and 434 (SAIS) times that authorship appeared in the venues. When accounting for repeated authorship the counts lowered to 375 (MISQ), 115 (SIM), and 323 (SAIS) authors. This total number of non-repeating authors is the nodes of the social network.

There was minimal overlap of authors between each of the venues. Only fourteen authors appeared in two of the three venues. These fourteen researchers were: Hillol Bala, Richard Baskerville, Pamela Galluch, Geoffrey Hubona, Elena Karahanna, Richard Klein, Wolfgang Konig, Alan Lee, Kalle Lyytinen, Arun Rai, Michael Rosemann, Frantz Rowe, Jason Thatcher, and Viswanath Venkatesh. None appeared in all three venues. This points to the dichotomous nature of the IS field publishing circuit, not only between countries but also between differing venues.

DATA ANALYSIS & RESULTS

When looking at the authorship data articles with one, two, three, four, five, and six authors were identified (Table 2). One distinct difference that immediately stood out was the fact that the North American venues were similar in that the majority of papers were with two authors but there were also papers with larger amounts of authors including four, five, and even the existence of one article with six authors in each. The only glaring difference between the two North American venues were that single authored papers were rare in the case of MISQ, while more than double the amount of single author papers exist for SAIS. This may be due to the fact that the review process of MISQ is extremely rigorous, and taking on such a process on ones own may be much more challenging than working with others.

	Total Papers	Single Author	Double Author	Triple Author	Quadruple Author	Quintuple Author	Sextuple Author
MISQ	202	30 (14.9%)	97 (48.0%)	49 (24.3%)	20 (9.9%)	5 (2.5%)	1 (0.5%)
SIM	72	34 (47.2%)	23 (31.9%)	15 (20.8%)	0 (0%)	0 (0%)	0 (0%)
SAIS	209	66 (31.6%)	79 (37.8%)	50 (23.9%)	11 (5.3%)	2 (1.0%)	1 (0.5%)

Table 2. Authorship Data: Number of Authors (Percentage of Total)

By contrast, for the French journal almost half of the articles (47.2%) were single authored. Also the number of articles with multiple authors plateaus at three for SIM as there are no papers with four or more authors during the five-year period. The difference here may be the publication culture as usage of multiple authors over three in the French IS journal seemed to just not be done.

No. of Repeat	MISQ	SIM	SAIS
8			1
7			1
6			1
5	2		3
4	4		4
3	9		17
2	49	6	33
Total Repeated Authors	66	6	60

Table 3. Authorship Data: Number of Repeated Authors

Another interesting find is that number of authors that are repeated in each venue (Table 3). Again we see a North America vs. France split here in that more repeats are prominent in MISQ and SAIS. While there are a number of authors that have

repeatedly published three or more times in MISQ (17) and SAIS (26), there are only six authors that have published two times in SIM and none have published three or more times in SIM over the last five years. An important note is that MISQ is the only venue of the three that has an editorial by the editor in chief (EIC). In creating Table 3 I did not count these as articles so the past EIC, Carol Saunders did have 14, and the current EIC, Detmar Straub did have six publications in MISQ including editorials.

	Nodes	Edges	Most Connected
MISQ	375	454	10
SIM	115	66	4
SAIS	323	330	13

Table 4. Social Network Stats

An important difference between MISQ and SAIS is that repeat publishing in MISQ is probably a difficult activity due to the rigorousness of MISQ publishing standards. Of the sixty repeat authors in SAIS, close to half (27 out of 60) have published three or more times. While for MISQ only 17 of the 66 (25.8%) have published three or more times.

When put into a network the North American venues were more dense (Vlado 2010) than the French one (Figures 1 through 6. Figures were drawn using Pajek). The nodes represent the authors so the number of nodes (Table 4) is the same as the number of authors (Table 1). The number of edges represent a co-authorship. Due to the larger number of authors in the North American sample, one can see that the number of edges are larger for that sample. MISQ however is the most dense of the three (Figure 1 through 6).

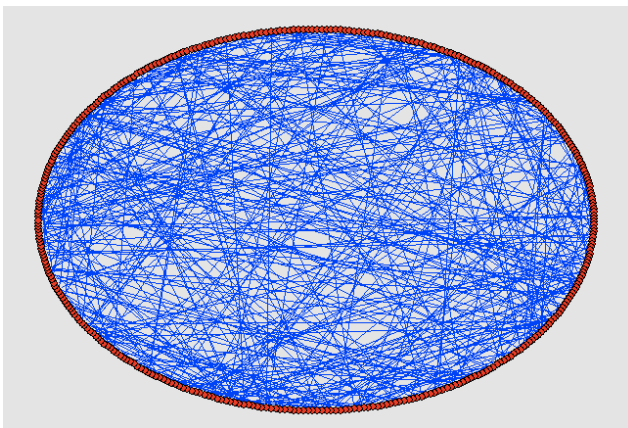
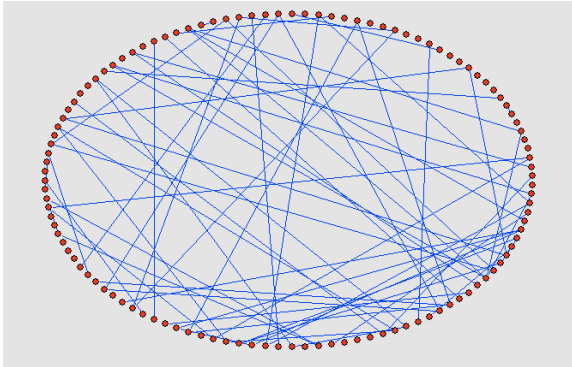
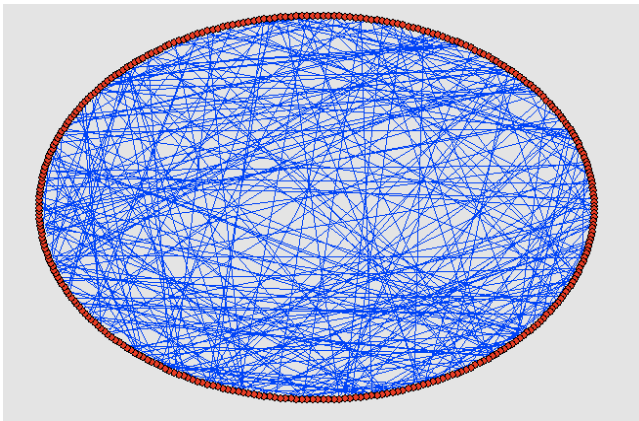
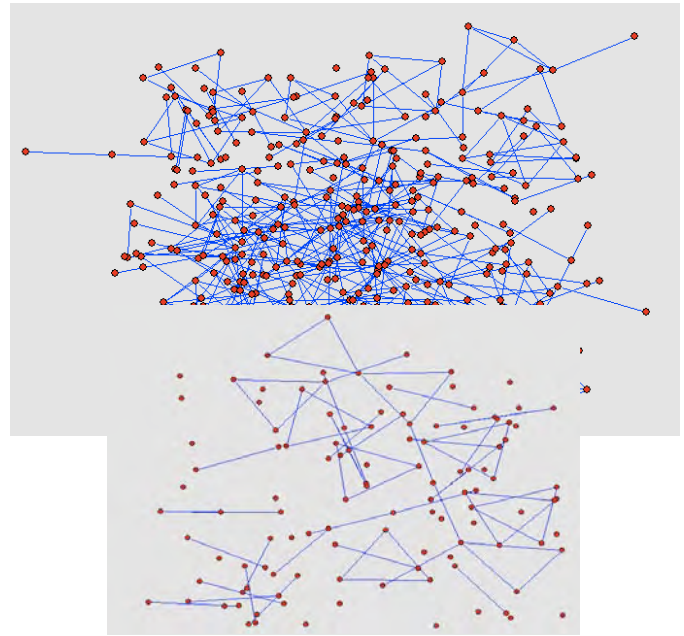
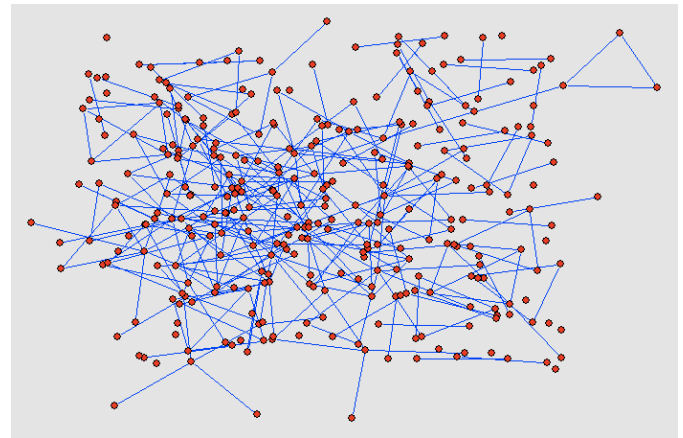


Figure 1. MISQ Social Network Circular**Figure 3. SIM Social Network Circular****Figure 5. SAIS Social Network Circular****Figure 4. SIM Social Network Free Form****Figure 6. SAIS Social Network Free Form**

FUTURE RESEARCH

Future research will expand upon the venues used, the increase in longitudinal data, and the extension to co-citation analysis. Venues will be expanded by adding more journals and conferences. The addition of more cross cultural research will expand the scope to a more global look at the IS field. One area that the current research did not touch upon was co-citation analysis. Citation analysis is prominent in analysis of the IS field and other fields in the business school. Expansion to co-citation analysis is currently underway.

CONTRIBUTIONS

By taking a SNA approach to the look at the IS field, this research has tried to identify the linkages between authors in IS. One problem identified by the research is that by looking at three differing venues, one a prominent North American journal, one a prominent French journal, and one a regional conference, we see that there is much opportunity to integrate the researchers that publish in these differing venues. The hope of this author is that more collaboration across these seemingly 'cliquish' groups will allow more dynamic and interesting research to flourish.

LIMITATIONS

By using a limited dataset the research only begins to scratch the surface of what the IS field looks like. The fact that only three venues were used is a weakness of the paper. Also the timeframe of five years, although good enough to give us a glimpse of the IS field, can be longer. SNA is also limited in that influence can be measured not just by co-authorship but can

include many other observations such as, and not limited to, citations, meetings, phone conversations, attendance at a conference, and working in the same location.

Another limitation of this study is in the data cleansing. Identification of identical names was a difficult and tedious process. Depending on the venue format, names may or may not include middle names, initials. First names may or may not appear as initials. Identification of these duplicates was left to the author and some errors are inevitable.

CONCLUSION

This research has attempted to use SNA to identify the researchers' social network in IS using three different venues. Three things have been highlighted by this research. One is the glaring difference that we see is the difference in publication strategy and co-authorship between North America and France. Second there seems to be even a difference between the two North American venues due to the difference in rigor placed in the publication process. Finally there seems to be a disconnect across the three venues as only fourteen researchers were identified as being published in two of the three venues and none were identified to have published in all three venues.

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